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## ABSTRACT

This paper is a report on findings of a study conducted with the purpose of assessing the level of technology skills of graduate and undergraduate students enrolled in the teacher education program at Eastern Kentucky University. The study revealed both strengths and weaknesses in relation to a new technology standard for teachers recently adopted by the state of Kentucky. A survey focusing on computer skills needed by adult users of computer hardware and software was administered to three cohorts of undergraduate students: (1) all students enrolled in the first course in the language arts sequence for elementary and middle grade majors; (2) all students enrolled in the elementary blocked methods classes; and (3) all students enrolled in middle grades methods classes. Marked differences were found among the three groups. These differences were analyzed and used as a basis for recommended changes in the teacher education program. (MES)

## Beyond Computer Literacy: Addressing the Evolution of Technology Standards

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**Abstract:** This paper is a report on findings of a study conducted with the purpose of assessing the level of technology skills of graduate and undergraduate students enrolled in the teacher education program at Eastern Kentucky University. The study revealed both strengths and weaknesses in relation to a new technology standard for teachers recently adopted by the state of Kentucky. Marked differences were found among three groups of undergraduate students. These differences were analyzed and used as a basis for recommended changes in the teacher education program.

### Introduction

The state of Kentucky has been engaged in a wide-ranging reform of elementary and secondary education since the Kentucky Educational Reform Act (KERA) of 1990. As part of that reform, the state has adopted New Teacher Standards (NTS) and Experienced Teacher Standards (ETS) for initial and continued certification for teachers. Although technology was an emphasis in KERA, no standard for technology was included in either the New or Experienced Teacher Standards. In early 1999, the Kentucky Education Professional Standards Board proposed that a new standard for technology be added to both the New and Experienced Teacher Standards. As a part of preparation to meet such a standard, the authors conducted a survey in the College of Education at Eastern Kentucky University to assess technology needs of undergraduate and graduate teacher education students and to compare the needs with those of a selected sample of faculty members. The new technology standard was adopted by the Kentucky Department of Education in October 1999.

### Project Description

Eastern Kentucky University is one of the eight state supported universities in the state of Kentucky and has the largest teacher preparation program in the state. A computer literacy requirement has been in place for pre-service teachers for several years. Approximately five years ago, all course syllabi for teacher preparation programs were re-examined and revised to include a technology component. It seems important to ascertain the level of skills attained by teacher education students who have been in this program before deciding whether additional provisions are needed to meet the change in Kentucky Teacher Standards.

Kentucky's technology standard for teachers is similar to guidelines established by the International Society for Technology in Education (ISTE) as the *Recommended Foundations in Technology for All Teacher*. (ISTE, 1997). Kentucky's introductory standard statement is: "The teacher uses technology to support instruction; access and manipulate data; enhance professional growth and productivity; communicate and collaborate with

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colleagues, parents, and the community; and conduct research" (Kentucky Department of Education, 1999). This statement is followed by 16 performance criteria that relate to how the teacher uses technology in the preparation and delivery of instruction and for professional growth and productivity. Findings from the survey described in this paper were analyzed in relation to these performance criteria, and recommendations for changes in the teacher preparation program were made based on the analysis.

Several constraints exist for proposed changes in the teacher preparation program designed to meet the new standard. First, there is an immediate need for addressing the new standard. The state has developed an implementation time line such that teachers beginning their teaching career in the fall of 2000 will be held accountable for the standard. Second, any new course proposal would be highly unlikely to be approved due to the university's desire to limit the number of credit hours to 128 for all teacher preparation programs. Even if approved, students currently in the program could not be required to complete an additional course. Third, the university climate would make it extremely difficult to get approval for a course designed to focus on technology for teachers. Taken together these constraints require accelerated but thorough planning for assessing strengths and weaknesses in the current program, integrating instruction for use of technology into existing required classes, and designing means for helping faculty members utilize technology more efficiently and productively in their classes and as part of course requirements.

A survey focusing on computer skills needed by adult users of computer hardware and software was administered to three cohorts of undergraduate students during the fall semester of 1999. The three groups included (1) all students enrolled in the first course in the language arts sequence for elementary and middle grade majors (juniors), (2) all students enrolled in the elementary blocked methods classes, and (3) all students enrolled in middle grades methods classes. These students were all either junior or senior level students who were enrolled in teacher education programs. The survey was also administered to two groups of graduate students enrolled in education classes, and to faculty members in the Department of Curriculum and Instruction.

### **Findings from the Project**

All the undergraduate students had taken at least one 3-semester hour credit class related to computer literacy and/or usage. Approximately 86% reported that they have a computer at home, yet only 45% responded that they felt very confident about using them. Another 39% stated that they felt somewhat confident in their use of computers. A few students reported being timid about using computers and avoided them when possible.

A majority of the graduate students had taken a minimum of one course plus additional in-service computer training. They represented a wide variety of teaching levels and experience. Approximately 70% reported having their own computers at home. Length of use and frequency of use varied for this group. Some had used computers less than two years, others reported two to four years with many reporting more than five years use for instructional purposes. However, most had used them for word processing and electronic mail only.

Very few of the faculty members surveyed had any college credit hours in computers, but most had taken some in-service computer training. Eighty-two percent reported having computers at home and all have computers in their offices as well as access to related peripheral devices (e.g. scanners, video and digital cameras). The majority reported using computers for more than five years and most said they used them on a daily basis. However, like the graduate students, most faculty members used them for word processing and electronic mail only.

All the groups reported good skills in using computer technology to access electronic mail and use the Internet. Most of the respondents reported using electronic mail for communication. A similar majority responded that they use the Internet for research to support instruction. All three groups also reported feeling comfortable with operating a computer and some types of software. The major software used was a word processing program. These findings indicate areas of strength in all groups.

In a question on using database programs, 2% of the juniors, 14% of the elementary methods students, 21% of the middle grades methods students, and 27% of the graduate students reported using databases regularly while only one faculty member did so. Forty-two percent of the elementary methods students, 46% of the middle

grades students, 34% of the juniors, 33% of the graduate students and 15% of the faculty reported using spreadsheets regularly. All these percentages represent less than half of any group. Since a part of the new technology standard is that everyone will be able to use productivity tools for database management and spreadsheet applications, these results are an indication of a major need area for all groups surveyed.

Several questions in the survey were related to the skill level of the teacher in operating a multimedia computer and peripherals and in doing simple connections and installations of the computer and peripherals. All groups reported being somewhat unsure about installation and troubleshooting minor problems with both hardware and software. All groups rated themselves low on being able to evaluate the type of hardware needed for use in the classroom for instruction. They also rated themselves low on being able to use a computer manual and other technology reference materials. This indicates additional areas of need for all groups surveyed.

In some skill areas there was a marked difference in the response of the various groups. The students enrolled in the middle grades methods courses rated themselves higher on five areas of technology use for instructional purposes. These areas were 1) creating multimedia presentations and using presentation software in the teaching of lessons, 2) using the scanner and video and digital equipment in preparation of lessons and for professional productivity, 3) choosing appropriate software for use in the classroom, 4) developing lesson plans that include using the computer as a part of the instruction, and 5) planning pre- and post-computer interaction activities.

One area in which the graduate students rated themselves more skilled than the other groups was in the use of computer software to individualize instruction. Sixty percent of the graduate students, 45% of the middle grades methods students, 35 % of the elementary methods students, 16% of the juniors and 40% of the faculty members rated themselves high in this area.

## Discussion

The discussion of the findings and recommendations drawn from the findings will focus on how the results of the survey can be used to change the teacher education program so that students have the opportunity to meet the sixteen performance criteria in Kentucky's new technology standard.

The strength areas found in all groups in word processing, use of electronic mail, accessing the Internet and utilizing software are among the most widespread uses of computers. This indicates a success area in our current teacher preparation program. Another explanation of this finding may be related to the fact that word processing, electronic mail and the Internet are helpful for two basic functions of teaching and learning. These functions, accessing and communicating information, were accomplished by teachers in the past using reference books and pencil and paper tasks. Some software programs utilized by teachers may be merely a different form of worksheets and learning centers. This relationship to traditional functions may lead both in-service and pre-service teachers to feel more comfortable with these areas.

Areas of need for all groups surveyed include the use of databases and spreadsheets as well as the technical aspects of technology use such as connecting and installing computers and peripherals, installing software, and troubleshooting minor problems with hardware and software. In addition, a low rating was reported by all groups in using computer manuals and other technology reference materials. These specific areas of need represent a current weakness throughout the teacher education preparation program in relation to the new technology standard.

Three major differences among the survey groups were noted in the analysis of the survey data. First, the students at the junior level in the early language arts course rated themselves lower than the two groups enrolled in senior level methods classes. This was particularly noticeable in the areas of planning and implementing instruction. This finding was to be expected since the students in the junior level group had experienced fewer opportunities in planning and implementing instruction and less exposure to instructional software. These students did report approximately equal skill in word processing with the other groups but less skill in database and spreadsheet applications.

The second difference among the groups, the finding that graduate students were more skilled in using computer software to individualize instruction, is also to be expected. These graduate students are classroom teachers with many opportunities to use computer software with students on a daily basis.

One other difference among the groups was the most interesting and useful finding, that students in the middle grades methods courses were more advanced in skills and usage than the other groups. In examining this phenomena, a model emerged that could be used with other groups of students. The five middle school faculty members worked as a team to decide on technology skills that they felt were important for the middle grades education students to use in the block experience. The instructors conducted technology seminars for students at the beginning of the semester and then expected the students to use the skills in preparation of class assignments. These seminars were developed with the aid of the College of Education technology coordinator, who then trained the faculty members to deliver the seminars to the students. Faculty members became "experts" in teaching one area of computer skills through both the training and delivery of the seminars to five groups of students. Two members of the middle grades faculty had received training in online course development. They used this training and developed an online component for all courses in the middle grades block. This component included resources such as course syllabi, schedule of class times, electronic addresses, forms needed for the course, assignment guidelines, and other materials often given as hard copy handouts. This web enhanced component of the course helped students become familiar with a distance learning application which used online materials for learning.

## **Recommendations**

In considering the new Kentucky technology standard and the sixteen performance criteria associated with it, a plan can be designed for improvement of the teacher education program that is based both on the findings of the survey and on the criteria teachers will now be expected to meet.

Since all students are required to take a basic computer applications course, six of the performance criteria can be met within that course. The faculty who teach this course are now redesigning the course to focus more on the performance criteria related to operating the computer and peripherals; connecting peripherals to the computer; installing software; using computer and technology terminology; uses of technology in business and society; and legal and ethical issues related to technology use. In the future, this course will also focus more on database and spreadsheet skills rather than word processing.

In redesigning the pre-service teacher education program three years ago, a special education course was made a requirement for all education majors. This course seems an appropriate place to incorporate a seventh criteria which is for students to learn about the use of assistive and adaptive devices for students with special needs.

Another existing course into which one performance criteria could be incorporated is a course on assessment in education. The criteria addresses the need to use technology to support multiple assessments of student learning.

A ninth criteria is for students to use distance learning applications to enhance professional productivity and support instruction. The web enhanced format used by the middle grades faculty provides a model for one such application. Since compressed video courses are offered on campus, the compressed video rooms could be used for pre-service teaching majors to communicate with schools as a part of their field experience.

Another group of five performance criteria are specifically related to instructional planning and delivery. These criteria could be addressed in the blocked methods courses. The middle grades model can be used as a base for redesigning the elementary methods block by incorporating training for faculty members, seminars for students, course assignments that require using technology skills, and adding a web component to the courses. In addition, the content areas of mathematics and science within both methods blocks lend themselves to more intense emphasis on utilizing spreadsheets in instruction. The two content areas of language arts and social studies similarly lend themselves to greater emphasis on databases.

The final two performance criteria include applying research-based instructional practices and facilitating lifelong learning of self and others through the use of technology. To address the first of these criteria it is

important to focus on raising skill levels of faculty. Working with the college technology coordinator, seminars addressing needed skills can be developed and delivered to the faculty. If faculty feel competent and comfortable using technology, they are much more likely to use technology and model its use for their students. Facilitating lifelong learning is a natural outgrowth of developing competence and comfort in all the other criteria. With competence and comfort in technology, faculty and students will use and continue to grow in their use and understanding of technology in education.

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